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ABSTRACT

This paper focuses on the use of a group action research approach to help student teachers develop strategies to improve the grade point average of at-risk students. Teaching interventions such as group work and group and individual tutoring were compared to teaching strategies already used in the field. Results indicated an improvement in the grade point averages of at least half the students. Four main observations were made through the study. First, students in the study group exhibited a variety of learning styles and responded differently to group work and tutoring. Some students learned better in group situations while others liked to work independently or in individual tutoring sessions. Secondly, new teachers working in a cooperative setting with discussion of teaching practices improved the sense of readiness as prospective teachers and promoted professional growth. Thirdly, teachers should always have at their disposal a large inventory of classroom techniques from which they can choose an appropriate mix to engage all students. Finally, collaborative efforts between teachers, administrators, students, parents, researchers, and other concerned members of the community were important and necessary to fully address the issues and concerns of all students, especially those at-risk. (CCM)

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Improving the Grade Point Average of Our At-Risk Students: A Collaborative Group Action Research Approach

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Running Head: IMPROVING AT-RISK GPA

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Improving the grade point average of student "at-risk" of failing or dropping out of school for any number of reasons has long been prominent in the thinking of teachers and researchers. An emerging research tool used in recent years to better understand and improve teacher thinking in education has been the use of collaboration and collaborative action research (Pate, 1997; Elliott, 1990; Noffke & Zeichner, 1987; Carr & Kemmis, 1983). In our study, we were interested in how the use of these collaborative techniques might help high school teachers understand and improve professionally in their instruction of "at-risk" students.

Historically, children of color and poor youth have been disproportionately at-risk in our schools, but they are not the only children at-risk. Those who lack sufficient support may fail to develop adequate academic and social skills (Rossi and Montgomery 1994). In a Horn and Carroll (1997) study of 1992 high school graduates, students at-risk were defined as those who had characteristics that increased their chances of failing or dropping out of high school, such as single parent households, having an older sibling who did not succeed in high school, changing schools two or more times other than for normal progression, having average or lower grades between sixth and eighth grades, being from a low socioeconomic environment, or repeating an earlier grade (Horn and Carroll 1997). Therefore, we define "at-risk" as those students at-risk of failing or dropping out of school due to academic or social factors. Since this definition is quite broad, we decided to narrow the focus of this project to academic achievement and look at strategies and techniques that might improve the grade point average (GPA) of these underachieving students. Low achievement is the characteristic most often used to identify at-risk students (Tompkins and Deloney, 1994).

It is also worthy of note that when we refer to action research by any name, we are

actually referring to a subset of action research called collaborative action research. More specifically, we are further referring to a subset of collaborative action research that we will define as collaborative group action research. In our study, we made use of collaborative group action research to answer our research question concerning the improvement of academic achievement of at-risk students in a high school setting.

The overall concept of "action research," as illustrated in Figure 1, has its foundation in the work of Kurt Lewin (1947). Lewin is most often cited as the "founder" of this form of research, which he called "action research," because he combined interventive actions and group research. Lewin took an existing group, introducing a change or action to it through a group facilitator, and observing the impact of such change or action. Lewin's study of "group dynamics" used a cylindrical process involving a recursive, nonlinear pattern of planning, acting, observing, and reflecting on changes in social situations observed by the facilitator. For the purposes of our study, we are using Lewin's definition of action research as the basis of our definition of collaborative group action research.

Collaborative action research is about teachers becoming more acutely aware of what is happening in their classrooms and developing a research focus upon their practice (Sanger, 1990). We are now finding that action research has and will continue to be used to look at roles and processes that initiate changes not only in education, but in areas such as industry, community, development, and the military (Noffke, 1995). The addition of the word "collaborative" to action research, illustrated as a subset of action research in Figure 1, implies that two or more researchers are working together. These researchers are actively exchanging ideas and expertise and are continually interacting as they conduct action research in an effort

to be more productive than if they worked alone. The collaborators meet together regularly to plan, conduct, reflect, and write about the action research they are conducting. There are different forms of collaboration and the setting for our collaborative efforts was a collaborative

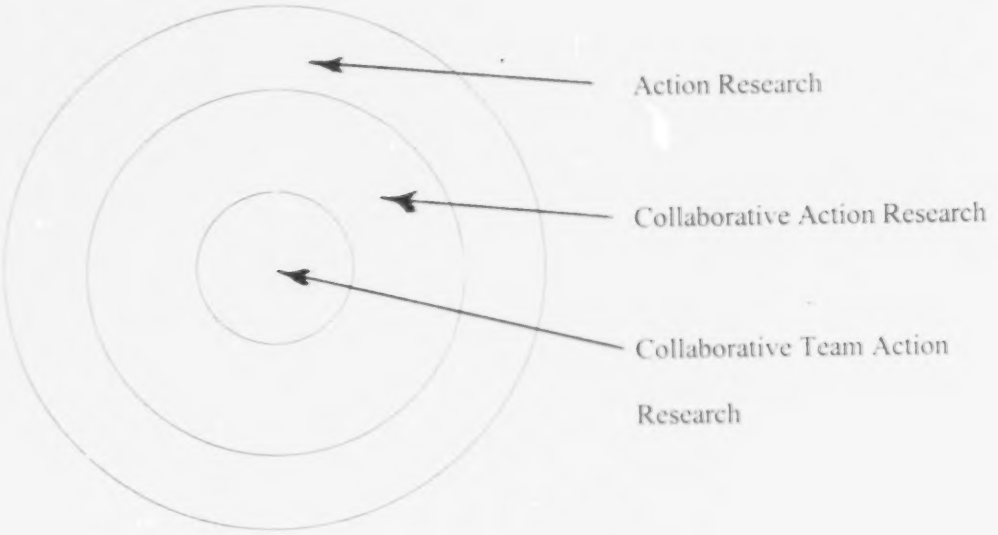

Figure 1. Relationship of collaborative team action research to collaborative action research and action research.

group of pre-service, in-service, and university educators. The use of the word "group," illustrated by the smallest subset of action research in Figure 1, emphasizes the true value of this approach to research because the research is done by a group of teachers, graduate students, and university researchers all involved in classroom-based research. The group setting allowed for regular interaction among the researchers and a place for discussion, brainstorming,

reflection, accountability, and organization of the process of conducting the research.

In summary, we define collaborative group action research for the purpose of this study as a group of pre-service and post-service teachers actively working together with a university researcher to ask questions of interest in an attempt to find answers that might help improve their practice. The ultimate beneficiaries of the process are the students, yet the teachers and university researcher also benefit from the new and relevant knowledge gained by experiencing the process. In addition, we see collaborative group action research as a methodology, a process of conducting research using a particular sequence of research strategies and theoretical perspectives (Saurino, 1998; Saurino & Saurino, 1996).

The varieties of collaborative action research are as numerous as the potential topics that can be addressed. However, the various types of action research do have a few common characteristics. Collaborative action research is generally qualitative in nature, aimed at developing new insights into schooling, education, teaching, learning, and/or finding new approaches to solving problems in education. Collaborative action researchers are interested in a deeper, richer understanding of the topic of their research.

This type of research also involves reflection, which provides the researcher an avenue to better understand what was learned from the research process and to better understand the implications of the findings. The research continues by repeating the process again, and begins with either a completely new question or a refinement of the initial question based on what was learned during the first research sequence. Therefore, collaborative action research can be an ongoing recursive sequence; each completed series of research steps often referred to as a "cycle" of research. The term cycle is a little misleading, however, since the research never

begins at the same point as the term "cycle" implies (Saurino, 1998).

Our Cycle of Collaborative Group Action Research

Action research is a methodology, a process of conducting research using a particular sequence of research techniques, strategies, and theoretical perspectives. The research group in our study consisted of two in-service secondary mathematics teachers, two graduate pre-service mathematics students, and a university collaborator. Meetings with various members of the group were scheduled regularly throughout the study, and an informal atmosphere was maintained. The group meetings provided a place where plans were made, questions were asked and answered, problems were discussed, and reflections were expressed. The group setting also provided an avenue to brainstorm for new ideas, strategies, and techniques used to initiate actions, direct the research, solve problems, and ultimately answer our question.

Phase 1: August 1998	Planning phase of the project and Cycle 1
Phase 2: September 1998	Baseline data collection for Cycle 1
Phase 3: October-November 1998	Intervention strategies/Modification of interventions
Phase 4: December 1998	Repeat baseline data/Reflection for Cycle 1
Phase 5: January 1999	Return to Planning phase for future cycles

Figure 2. The Phases of collaborative group action research.

The research process completed in our study involved four chronological phases and a planning phase for future cycles. The four chronological phases were based on the recursive

collaborative group research cycle outlined in Figure 2, and illustrated in Figure 3.

Phase 1 through 4 comprise the first research sequence of "Cycle 1" and Phase 5, and any following phases, might repeat the cycle to gain more information. After the first cycle, research questions could be modified or replaced, based on what was learned to date. A complete cycle, including all the steps in the research process as was conducted during our study, consists of the sequence of steps outlined in Figure 3:

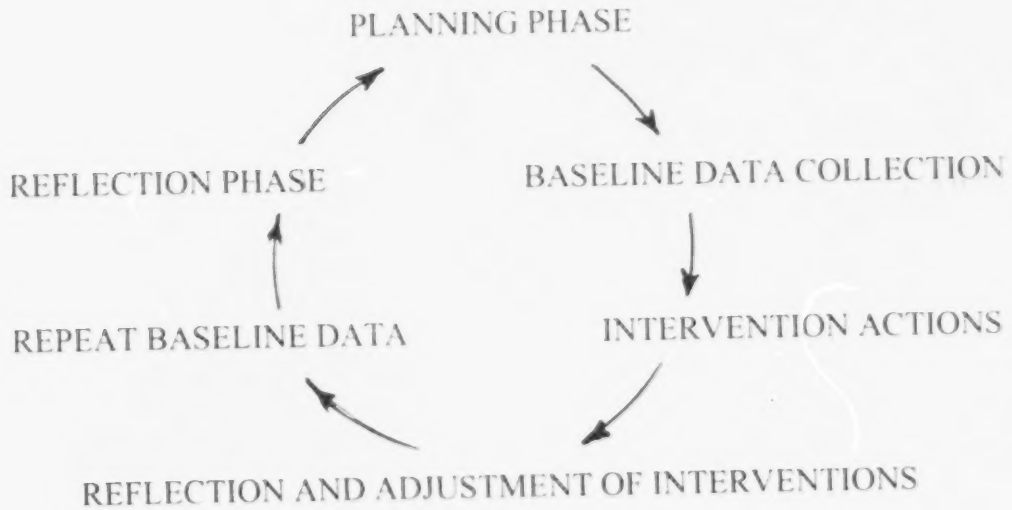

Figure 3: Illustration of one recursive sequence of collaborative group action research, often referred to as a "cycle."

As illustrated in Figure 2, Phase 1 (Planning Phase in Figure 3) began in August 1998 with an initial meeting of the pre-service teachers and the university researcher. The students

had volunteered to do the research after being contacted by the university researcher, but did not know any particulars about the process of conducting this type of research. The general plan of creating research questions, taking actions, collecting data, and reflecting was discussed and a basic time line for the cycle of research was established. The students had a variety of questions and concerns that were expressed and discussed. Their most arduous concern dealt with the amount of time required to complete this project. The university researcher emphasized the fact that the process was flexible and the time line could be adjusted. During the project, meetings were audio-taped and field notes created from observations and interviews with administrators, parents, students, and other teachers. In addition, everyone in the group kept a personal journal. These data were the source for this written report. The in-service were included at the beginning of pre-planning in early September and we finalized the research question for the cycle. The finalized research question is as follows:

What can we do to improve the grade point average of our at-risk students?

Phase 2 (in Figure 2) began after the new school year started in September of 1998. This marked the start of the "Baseline Data Collection" phase of the first cycle of research (see Figure 3). After the research question had been finalized, the next step was to start collecting data that would be summarized and used to establish what the current situation was with respect to the research question. The objective of this phase was to answer the question, "What is the current situation with respect to our research question?" This data established a "Baseline" against which we could measure change when we repeated baseline data collection later in the research cycle.

Our baseline data indicated that at the beginning of the school year our study geometry

class was taught using the following teaching techniques: teacher lectures, student seatwork, and student board work. Student performance assessments during the first few weeks of the school year indicated that two students were "at-risk" of failing mathematics and four other students were having routine comprehension problems serious enough to put them in the at-risk category. These six students became our at-risk study sample. More specifically, baseline data also showed that the six sample students lacked some of the basic fundamentals they should have learned in pre-algebra and algebra-one classes. The students lacked skills in plotting points, graphing equations, following the order of operations, in addition to adding, subtracting, multiplying, and dividing positive and negative numbers. In addition to the data collected about academic performance, our research also showed that the use of TI-83s or other graphing calculators was not a requirement of the geometry course. However, most geometry students elected to use the graphing calculators on their own. It was also determined that the high

NAME	TEST 1
Sam	76%
Pete	66%
Shal	75%
Kal	83%
Mona	–
Kev	42%

Table 1. Six-week interim geometry test grades for our at-risk group.

school did not offer any formal tutoring programs for students. However, according to the Assistant Principal, the high school offered counseling and mentoring programs for at-risk and minority students. The six-week interim grades for the six students are shown in Table 1.

except for Mona who had recently joined the class and did not yet have a cumulative grade for geometry. All names, other than the authors, have been changed.

Phase 3 (Intervention Actions and Reflection And Adjustment Of Interactions in Figure 3), included the interventive actions we took to answer our question, reflections about our actions, and adjustments of our interventions. It began in October (1998) as the student teacher started his four-week period of full-time student teaching. An initial intervention involved the student teacher working individually with the six sample students as time permitted during seatwork. In addition, the student teacher began incorporating student group work, endorsed by some researchers, during the geometry class to encourage teamwork and peer-teaching. Cooperative learning uses the peer group to attain academic and pre-social goals (Rossi and Montgomery, 1994). There is ample evidence that cooperative learning methods are instructionally effective in grades 2 through 9, but more research is needed to examine grades 10 through 12 (Slavin, 1990). Other interventions brainstormed by the research group were a campaign to get the students who were experiencing academic difficulty to come in after school for individual or group tutoring sessions, and instruction in the use of the TI-83 graphing calculator. Tutoring can adapt the teacher's instruction to the student's learning pace, learning style, and level of understanding (Gaustad, 1993). Specifically one-on-one tutoring is a powerful strategy for providing extra help to disadvantaged youth at all levels (Rossi and Montgomery, 1994). Also one-on-one tutoring has long been recognized as superior to group instruction for students with special needs (Gaustad, 1993).

During the third week of October, the student teacher conducted individual tutoring sessions with Mona and Kev, and conducted group-tutoring sessions with Pete, Sammy, Shal,

and Kev on algebra and geometry fundamentals. During this week, the students were given opportunities to work in groups for homework and specific in-class exercises. Beginning in the last week of October, tutoring sessions became homework review sessions, with individual and group exercises. The students were again placed periodically into groups of two or more to complete in-class exercises or homework assignments. More frequent board work was also incorporated during this week with our study sample. Also, the student teacher talked with Kev, Shal, and Pete concerning their grades as well as how they might improve their understanding and master fundamental skills in geometry. He had an individual tutoring session with Mona to cover plotting points, and to help her understand and identify polygons and non-polygons, encouraging more board work. He also implemented the routine of students explaining their work as they completed it at the board so he could get better feedback about what concepts the students understood and where the needed more help. He continued using groups of two or more students to complete in-class exercises or homework assignments.

The rest of the full-time student teaching time, during the first weeks of November, was spent continuing the individual tutoring when needed, group and board work, with extensive review sessions before and after tests. During our project, the high school began a formal tutoring program called The Saturday Toward Excellence Program (STEP). STEP is a combined school and community support project for improved academic achievement. It provides academic support to students by providing volunteer tutors who are willing to tutor students three Saturday mornings a month. The mathematics department also developed a formal tutoring program, perhaps influenced by our project, in November 1998 to target students with poor algebra-one skills. The program will be conducted during the one-hour

lunch period to support students during the school day. These interventions occurred too late to be included in our study, but we expect our sample students to take advantage of them in the future.

The first part of Phase 4 (Repeat Baseline Data in Figure 3) began in early December (1998) and basically consisted of a repetition of the data collection process conducted at the beginning of the cycle. The second baseline data allowed us to compare the current situation with that at the beginning of the study. By the end of the full-time period of teaching by the student teacher, two additional tests had been given to the geometry students. The results of all tests given and their averages are shown in Table 2.

Because of the relatively short timeframe the student teacher worked with these students, we did not expect to see large changes in academic performance, and were more interested in which techniques were producing positive results and how many students were being affected. The group tutoring and group work in class seemed to provide help and support for all the students, yet was not implemented long enough to significantly increase the GPA of half of our

NAME	TEST 1	TEST 2	TEST 3	TEST AVERAGE
Sam	76%	80%	86%	81%
Pete	66%	67%	62%	65%
Shal	75%	52%	31%	53%
Kal	83%	81%	93%	86%
Mona	–	69%	86%	78%
Kev	42%	24%	34%	33%

Table 2. Geometry tests grades and overall average for first ten weeks of school.

sample group. We believe Kev, Pete and Shal might even need more individual support as well as group interactions to show significant improvement in GPA. Their general mathematics and fundamental algebra skills where simply too far behind the rest of the class for them to keep up.

As additional data at the end of the study, the student teacher interviewed the students and asked under what conditions they felt they learned better in their attempt to understand geometry. Kal indicated that he learned better when the teacher explained the concepts either in a lecture setting or in individual tutoring sessions. He said, "I don't like groups because with the talking it's too noisy for me to concentrate." Yet Mona felt that she got more benefit from working with groups than working alone. Kev said, "I learn better when the teacher explains a problem, works and example, and then I attempt to solve problem for myself." Pete and Shal said that they learned best in one-on-one tutoring sessions, and Sammy felt that he learned more from teacher lectures and board work.

Also, the student teacher consulted with a number of other teachers. The basic question asked was, "What teaching methods do you feel provide the most help and support to all students, but especially the at-risk students?"

Mr. Weems, English as a Second Language (ESL) Mathematics class: "I can't do too much lecturing because they don't understand it. I use lots of examples. Most work is done with work sheets and in-groups. These kids work much harder than regular algebra kids … Give instant feedback when the students begin work to check their understanding and steer them in the right direction."

Mr. Waters , Physics: "I have to lecture, but I do as little as I possibly can. Demonstrations and laboratory experiments are effective. I try to do an experiment at

least once a week. Kids work well in groups for problem solving. In my opinion, math people could do a better job if they did some experiments and demonstrations."

Ms. Rich, Algebra I: "I give quizzes every day in order that they [the students] think about each homework assignment and every day matters. I frequently have students work in pairs of their own choice. Lots of good tutoring goes on that way."

Ms. Hann, the student teacher's in-service cooperating teacher: "The kids who were doing poorly still seem to be doing poorly and those who were getting by are doing better. We can't do what we need to do, that is regroup some kids and take them back to where they need to be [lower level math]."

Ken Hinson, the student teacher: "I think the classes should be revised to allow more time where possible for student group work on homework and in-class exercises. Individualized tutoring must continue for some of the students."

The other part of Phase 4 (Reflection Phase in Figure 3) began after all the data had been collected. We examined the data and made direct comparisons between the initial and final baseline data. Then we reflected on the other data collected, what we had learned as a result of experiencing the process of conducting the research, and the research as an ongoing cycle. We reflected that we had highlighted a few effective techniques that might improve the GPA of most at-risk students if implemented consistently over a long period of time. We also believe that other techniques and strategies might be found to be effective if we continued the research question through more cycles. We agreed that experiencing the research process made us more aware of the needs of our at-risk students, and that by becoming proficient with the research process itself, we could continue to grow professionally through other projects.

Conclusions

In summary, we found the collaborative group action research approach a challenging and worthwhile learning experience. We observed how teaching strategies were being used in the field and compared them to new strategies we were learning as student teachers and researchers. Our ultimate goal was to put appropriate strategies into practice to improve the grade point average of at-risk students. In this study, interventions such as group work and group and individual tutoring were used. By the end of the four weeks of full time student teaching it appeared that these interventions had some positive influence on improving the grade point averages of at least half our students. However, we feel that with more time and the use of comparison groups we could confirm this observation.

A specific detail we noted during the process was that the students in our study group exhibited a variety of learning styles. They responded differently to group work and tutoring, the two main interventions that were used. Some students learned better in group situations while others liked to study independently or preferred individual tutoring sessions. According to Rossi and Montgomery (1994), although the need to "raise the performance of at-risk-youth" has become a popular rallying cry of school reform, there is often confusion and disagreement as to how to motivate and who is motivated to improve their academic situations. Our students actively sought help and support, and each worked hard to understand concepts and put them into practice. Another important item we noted was that working with cooperating teachers in the schools and discussing our individual teaching practices with fellow teachers seemed to help improve our sense of readiness as prospective teachers, or promoted professional growth in our practice.

We think more research is needed relative to what teachers are doing to improve the GPA of at-risk students and what other techniques and strategies might improve their chances for success in school. Rossi and Montgomery (1994) further indicated that changes in traditional forms of instruction are needed to engage students at-risk, and that such instructional strategies would mean moving away from passive teacher-lecture/student-listen modes to more active arrangements of learning activities.

One factor in an emerging consensus of how schooling is best designed for at-risk students is described as "raising expectations for all students" (Guthrie, 1991). We believe teachers should always have at their disposal a large inventory of classroom techniques from which they can choose an appropriate mix to enhance the learning of all students. Perhaps the size of the inventory and the frequency of use are key to providing improved support for at-risk students.

Finally, we feel that a way to grow continually as a teaching professional and engage in activities that might answer questions such as ours about at-risk students is to promote participation in collaborative research. In addition, we feel that collaborative efforts between teachers, administrators, students, parents, researchers, and other concerned members of our community are very important and necessary to fully address the issues and concerns of all our students, especially those at-risk.

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